Tropidia namasiae, a New Species of Orchidaceae (Epidendroideae, Tropidieae) from Southwestern Taiwan

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ABSTRACT. *Tropidia namasiae* C. K. Liao, T. P. Lin & M. S. Tang, a new species of *Tropidia* Lindl. (Orchidaceae, Epidendroideae, Tropidieae) from the Namasia District in southwestern Taiwan, is described and illustrated. The species is mainly characterized by its subopposite and ovate to lanceolate leaves and dorsal sepals (3.5–4 mm), the smallest observed among species of *Tropidia* in Taiwan. The new species is closely related to *T. angustifolia* C. L. Yeh & C. S. Leou, but differs in leaf shape, size, and number as well as the number of flowers per raceme. Morphological similarities between these two species can be seen in the shapes of the floral lip and column, as well as lengths of the leaf blades. A key to the six species of *Tropidia* in Taiwan is also provided.

Key words: Epidendroideae, IUCN Red List, Orchidaceae, Taiwan, *Tropidia*, Tropidieae.

Tropidia Lindl. is a tropical genus (Orchidaceae, Epidendroideae, Tropidieae) with 20 to 40 species that is primarily distributed from northeastern Australia through the South Pacific Islands and in India and southeastern Asia, including southern China and Malaysia, and from the Japanese Ryukyu Islands south to Taiwan. One species, *T. polystachya* (Sw.) Ames, is known to occur in the Neotropics, ranging from Florida south through the West Indies, from Central America, Venezuela, and the Galapagos Islands (Schuiteman & de Vogel, 2000; Su, 2000; Pridgeon et al., 2005; Chen et al., 2009). Plants of the genus share a combination of morphological features that include adventitious roots with nodules or tubers, stiff and erect stems, distinctly plicate leaves, one fertile anther with viscidia at the apex, and two staminodes, with the pollen grains aggregated within two pollinia (Su, 2000).

Three species of *Tropidia* were treated for the orchid flora of Taiwan (Su, 2000): *T. somae* Hayata, *T. curculigoides* Lindl., and *T. nipponica* Masam. Lin et al. (2006) described a new species, *T. nanhuae* W. M. Lin, L-L. K. Huang & T. P. Lin, from bamboo forest at 150 m, from Tainan County. *Tropidia nanhuae* is similar to *T. curculigoides* in the narrowly lanceolate or lanceolate to oblong leaf blades, but differs mainly in its dense racemose inflorescence. Yeh et al. (2009) described an additional species, *T. angustifolia* C. L. Yeh & C. S. Leou, from Pingtung County, collected from cloud forest at 600–800 m on Mt. Lilung. The authors noted that *T. angustifolia* resembles *T. nipponica*, but is distinguished by its linear to lanceolate leaves and larger, subsaccate corolla lips. Both *T. nanhuae* and *T. angustifolia* were described from southwestern Taiwan as endemic taxa.

In the spring of 2009, we made a field trip to the Namasia District in Kaohsiung City, southwestern Taiwan, and collected specimens of *Tropidia*. A remarkable feature of this collection was the subopposite, ovate to lanceolate leaves. After comparison with other species of the genus from Taiwan and elsewhere in Asia, we conclude that the plant from Namasia is indeed a new species, which brings the total of *Tropidia* species known from Taiwan to six.

KEY TO THE SPECIES OF *TROPIDIA* IN TAIWAN

1a. Leaves ovate to cordate or elliptic to ovate-oblong ... 2.
  2a. Height of plants less than 20 cm ..... *T. somae*
  2b. Height of plants greater than 20 cm ... *T. nipponica*
1b. Leaves narrowly lanceolate, lanceolate or ovate-lanceolate ..... 3.
  3a. Leaves more than 10 per stem .... *T. curculigoides*
  3b. Leaves less than 6 per stem ..... 4.
    4a. Leaves mostly 2 per node, 3 to 5 per stem ..... *T. namasiae*
    4b. Leaves 1 per node ..... 5.
      5a. Height of plants exceeding 20 cm ..... *T. nanhuae*

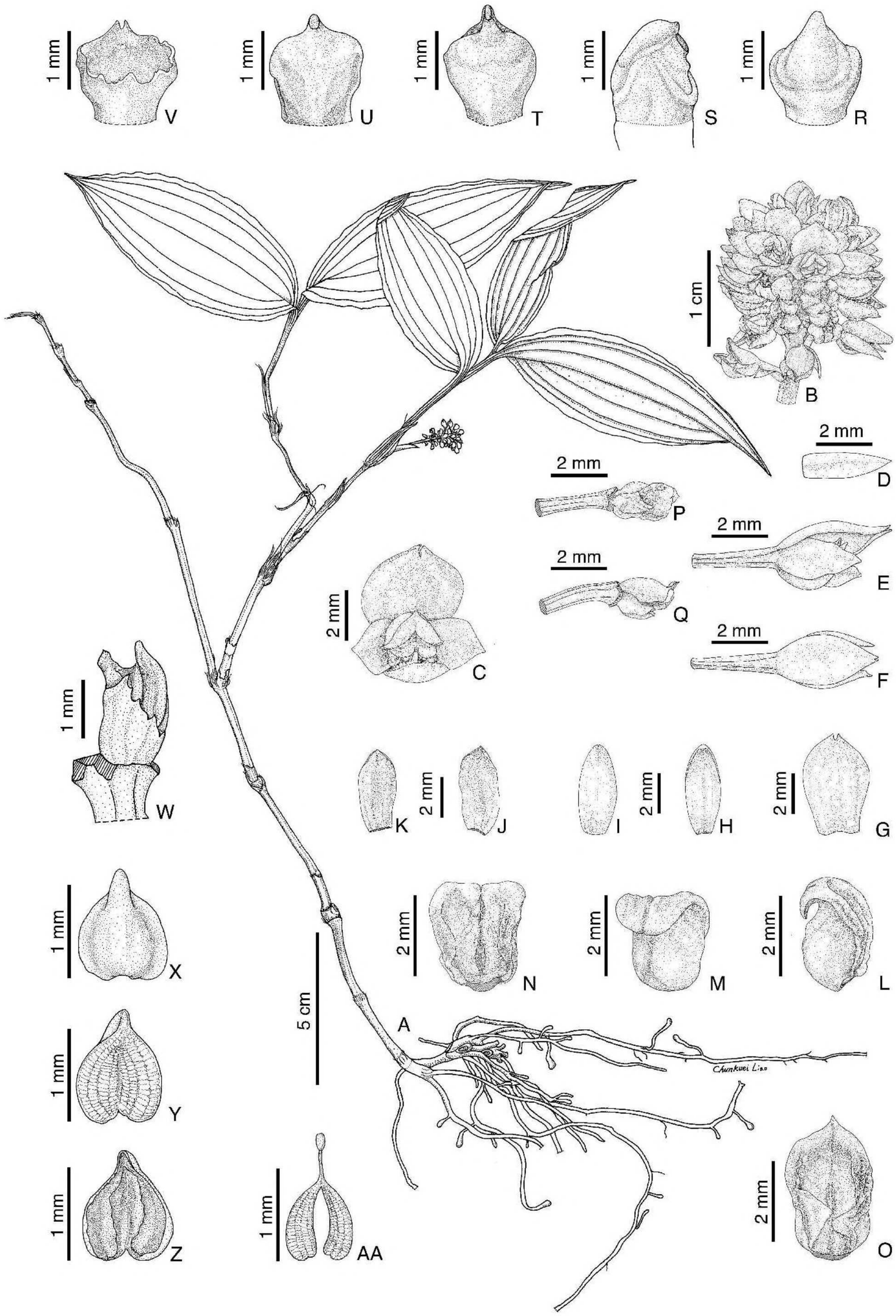

Figure 1. *Tropidia namasiae* C. K. Liao, C. P. Lin & M. S. Tang. —A. Fertile habit. —B. Densely congested raceme. —C. Individual flower, seen from above. —D. Bract. —E. Intact flower and column, with pedicel, lateral view. —F. Flower and column, with pedicel, ventral view. —G. Lateral sepals connate as synsepal, dorsal view. —H. Dorsal sepal, concave, as seen internally. —I. Dorsal sepal, external view. —J. Petal from flower right, internal view. —K. Petal from flower left, internal view. —L. Corolla lip, with folded apex, lateral view. —M. Lip, with folded apex, ventral view. —N. Lip, with folded apex, seen from above. —O. Lip, view from above, with the apical fold extended. —P. Column and lip of flower, dorsal view. —Q. Column and lip, lateral view. —R. Apex of column, dorsal view. —S. Apex of column, lateral view. —T. Apex of column, ventral view. —U. Column apex, with anther removed, ventral view. —V. Column apex, with anther removed, dorsal view. —W. Column in lateral view, note enfolded, bifid rostellum. —X. Anther, dorsal view. —Y. Anther, with the two pollinia evident, ventral view. —Z. Anther, with the pollinaria removed, ventral view. —AA. A single pollinarium. Drawn by C. K. Liao from the holotype, *C. K. Liao 3594* (TAI).

Table 1. The comparison of morphological characters and habitat between *Tropidia namasiae* and *T. angustifolia*.

Characters	*T. namasiae*	*T. angustifolia*
Stem height	40–60 cm	10–20 cm
Leaf shape	ovate to lanceolate	linear to lanceolate
Leaf size	7–10 × 3–4 cm	8–10.5 × 1.7–2.1 cm
Leaf base	obtuse or widely cuneate	cuneate
Leaf veins (lateral veins between veins)	7 (4 to 6)	5 (4 to 6)
Peduncle length	3.5–4 cm	4.5–5 cm
Flower number per raceme	20 to 35	9 to 12
Dorsal sepal shape and length	elliptic, 3.5–4 mm	obliquely oblong, 6.5–8 mm
Lateral sepal (connate as synsepal) shape	Obovate	oblong
Lateral sepal connate length and width	4.5–5 × 3–3.5 mm	8 × 3.8 mm
Petal length and width	4–4.5 × 2 mm	6.5–7 × 3 mm
Lip length and width	2.5–3 × 2–2.5 mm	5 × 3 mm
Column length	ca. 2 mm	3 mm
Anther length	ca. 1.5 mm	1.8 mm
Elevation	1380 m	600–800 m

5b. Height of plants less than 20 cm ..... *T. angustifolia*

Tropidia namasiae C. K. Liao, T. P. Lin & M. S. Tang, sp. nov. TYPE: Taiwan [Republic of China]. Kaohsiung City, Namasia Distr.: on mtn. ridge, 23°14′16.2″N, 120°43′41.5″E, 1380 m, 5 May 2009, *C. K. Liao 3594* (holotype, TAI). Figures 1, 2.

Haec species quoad sepala lateralia obovata fere connata, labium basiliter saccatum et columnam ad apicem rotundatam *Tropidiae angustifoliae* C. L. Yeh et C. S. Leou affinis, sed ab ea foliis ad quemque nodum plerumque duobus et racemo 20- ad 35-floro differt.

Herbs sympodial, terrestrial, perennial; rhizome short, ascending, with adventitious roots; roots tuber-bearing; stems erect, rigid, 40–60 cm tall, 3–4 mm diam., somewhat flattened; internodes 2–5 cm. Leaves subopposite, ovate to lanceolate, 7–10 × 3–4 cm, apex acute to acuminate, base obtuse or widely cuneate, margin wavy; veins 7, lateral veins 4 to 6 between veins; leaf sheaths ca. 2 cm. Racemes axillary, congested, bracteate, 3 × 2.5 cm; peduncle 3.5–4 cm; flowers 20 to 35, densely arranged, but not resupinate, glabrous, white, 11 × 11 mm; floral bracts lanceolate, glabrous, ca. 6 mm; pedicel and ovary ca. 7 mm. Flowers with the dorsal sepal free, elliptic, 3.5–4 × 2–2.5 mm, concave; lateral sepals ± connate, this synsepal cymbiform, obovate, bilobed at apex, 4.5–5 × 3–3.5 mm; petals free, similar to sepals, narrowly obovate, 4–4.5 × 2 mm, concave, keeled; lip yellow with orange at apex, the withered portion of lip red-brown at apex, but otherwise white, obovate, 2.5–3 × 2–2.5 mm, saccate at base, thickened and recurved at apex; disc with 2 longitudinal ridges; column straight, rounded at apex, including bifid rostellum ca. 2 mm; anther cordate, ca. 1.5 × 1 mm, margin revolute; pollinia 2, ca. 1.7 mm, sectile, granular; stipe and caudicle slender; viscidium ellipsoid; stigma elliptical. Fruit an ellipsoid capsule, longitudinally ridged, sparsely hirsute, 15–20 × 6–8 mm.

Distribution and ecology. *Tropidia namasiae* is endemic to Taiwan and is found only in the Namasia District, in Kaohsiung City. It is known from a single population of about 10 individuals from the under-story of a dense, evergreen, broad-leaved forest on a mountain ridge.

IUCN Red List category. *Tropidia namasiae* is assessed as Critically Endangered (CR B2a; D), according to IUCN Red List criteria (IUCN, 2001). This species has a very small and restricted population, because less than 10 individuals were in the population and only one population was found. The new species was not seen in this area from 2002 to 2004, based on the experience of vegetation research by first author (Chou et al. 2007), with the type collections made in 2009.

Phenology. *Tropidia namasiae* was observed in flower from May to June, with fruits observed from December to February.

Etymology. The specific epithet is derived from the location where the type specimen was collected.

Discussion. *Tropidia namasiae* is closely related to *T. angustifolia*. The morphological similarities of these two species are the shapes of lip and column and the length of leaves. They differ in their leaf shape, size and numbers per stem and the flower numbers per raceme. The comparison of morphological characters between the two species is given in Table 1.

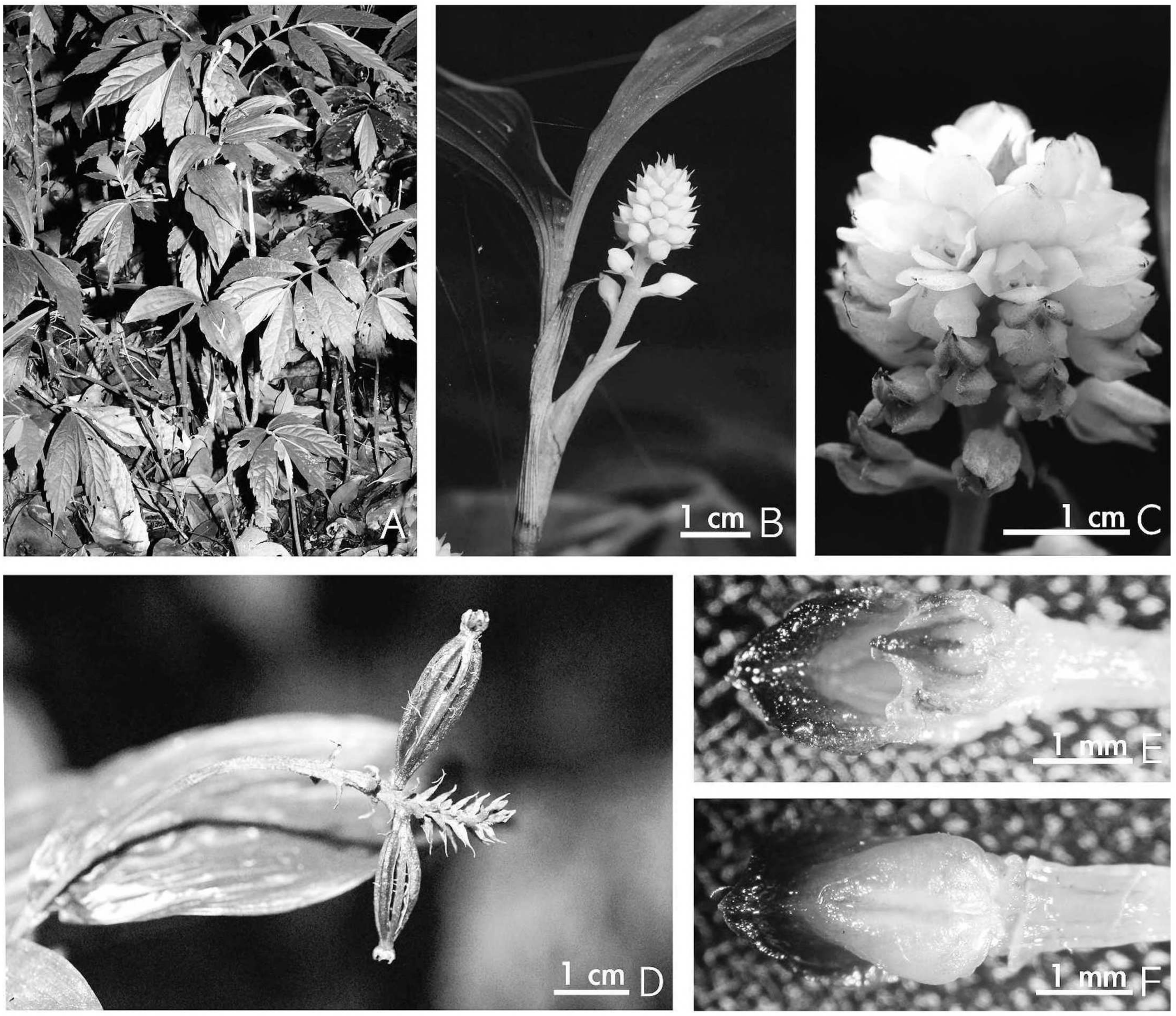

Figure 2. *Tropidia namasia* C. K. Liao, C. P. Lin & M. S. Tang. —A. Habitat at type locality. —B. Pre-anthesal inflorescence. —C. Inflorescence in full anthesis. —D. Post-anthesal inflorescence, with two capsular fruits visible. —E. Folded lip of corolla, with column and pedicel, dorsal view. —F. Folded lip with column and pedicel, ventral view.

Paratype. TAIWAN [Republic of China]. **Kaohsiung City, Namasia Distr.:** on mtn. ridge, 23°14′16.2″N, 120°43′41.5″E, 1380 m, 16 Feb. 2009, *T. P. Lin s.n.* (MO).

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